DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 6-11, 15, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Watanabe et al (WO 02/48456), or in the alternative, under 35 U.S.C. 103(a) as being unpatentable over Watanabe.

US 6,921,461 is being relied upon as an English language translation of WO 02/48456. All references below to column and line numbers correspond to US 6,921,461.

Watanabe discloses a papermaking press belt for a shoe press which includes a reinforcing substrate embedded in an elastic material. The elastic material contains a surface layer, a back layer, and an intermediate layer located between the surface layer and the back layer. The intermediate layer has a thick part which can be exposed on the belt surface through the surface layer as shown in Figure 3. The thick part is made of a low-hardness elastic material

and the surface layer is made of a high-hardness elastic material. Such a belt provides improved durability in the regions of the belt susceptible to cracks corresponding to the axial ends of the pressure shoe. See column 5, lines 4-21. See also column 7, lines 18-32 regarding the embodiment of Figure 3. The belt is made of a polyurethane made from a urethane prepolymer having isocyanate groups, NCO, on ends and a hardener having active hydrogen groups, H, on ends. The urethane prepolymer is derived from a polyol and a phenylene isocyanate derivative. See column 5, line 32 to column 6, line 40. Therefore, regarding the belt of claim 1, Watanabe discloses a press belt including terminal corresponding areas corresponding to both ends of the pressing means in the cross direction and a central area located between the terminal corresponding areas, and mainly composed of thermosetting polyurethane obtained from a thermosetting polyurethane material containing a phenylene isocyanate derivative having an isocyanate group (NCO) on an end and a hardener having an active hydrogen group (H) on an end.

Watanabe does not disclose that the equivalent ratio of H/NCO is set relatively high on the terminal corresponding areas and relatively low on the central area. However, it is deemed inherent that the end regions of the belt having the lower hardness has a higher H/NCO ratio than the central region of the belt having the higher hardness, or it would have been obvious to one skilled in the art to increase the H/NCO ratio of the polyurethane in the regions where a lower hardness is desired and/or decrease the H/NCO ratio of the polyurethane in the region where a higher hardness is desired. Evidence that a higher H/NCO ratio results in lower hardness is found in Table 1 (columns 11 and 12) and in the disclosure of column 11, line 61 to column 12, line 5. Looking at the hardness of the surface layer, a lower hardness of 93 is obtained when the

H/NCO ratio is higher (samples 4, 7, and 10), and conversely a higher hardness is obtained at the lower H/NCO ratio (samples 1-3, 5, 6, 8, 9, 11-14).

Regarding claim 2, a polyurethane obtained by reacting a urethane prepolymer having an isocyanate group (NCO) on an end and a hardener having an active hydrogen group (H) on an end is disclosed in column 5, lines 32-39.

Regarding claims 6 and 7, cavities (grooves) may be formed in the terminal areas as shown in Figure 4 and disclosed in column 7, lines 33-67. Wherein grooves may also be formed in the central area, the depth of the grooves in the terminal areas may be greater. See column 7, lines 60-64.

Accordingly, the method of claim 9 is deemed anticipated by or obvious over Watanabe for the same reasons, as Watanabe recites a belt having terminal ends and a central region, and recites preparing and hardening two different polyurethanes for those regions. Regarding claim 10, at least the outer peripheral surfaces of the belt, corresponding to the surface layer and the exposed portions of the intermediate layer are formed in this manner

Regarding claims 8, 11, 15, and 16, which are dependent on claims 1, 2, 6, and 7, respectively, a shoe press roll comprising the belt of Watanabe is disclosed in Figure 1.

Claims 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe (WO 02/48456) in view of Watanabe (US 6,736,939).

The belt of Watanabe, WO 02/48456 is described above regarding claim 1. In this Watanabe reference, the thickness on the terminal corresponding areas is not disclosed as being smaller than the thickness of the central area.

Watanabe, US 6,736,939, discloses a press belt having end regions corresponding to the edges of the pressing zone and having a central region in between the end regions. The belt is constructed to have a relatively lower hardness polyurethane in the end regions as compared to the polyurethane used in the central region. Because of this, the end regions can be made thinner than the central portion of the belt, thereby further reducing potential cracking in the end regions. For the same reasons, it would have been obvious to one skilled in the art to construct the belt of Watanabe, WO 02/48456, to have thinner end regions, further providing resistance to cracking.

Allowable Subject Matter

Claims 3, 4, 12, and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

The belt of claim 3 and the shoe press roll of claim 12 are allowable for specifying the values of the H/NCO ratios for the terminal and central regions.

The belt of claim 4 and the shoe press roll of claim 13 are allowable for providing a difference in hardness of less than 1 degree type A durometer hardness.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Muellner (US 5,943,951) discloses a press belt having an end region (9) with greater flexibility.

Ishino (US 6,042,695) discloses a press belt made to have a lower hardness at the end regions corresponding to the edges of the pressing region than that of a central region between the ends.

Sakuma (US 6,780,287) discloses a calendering belt having end regions with material of higher heat resistance than the material of a central region.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric Hug whose telephone number is (571) 272-1192.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Eric Hug/
Primary Examiner, Art Unit 1791